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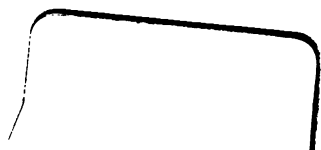
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Sailing Directions
FOR
THE WHITE SEA,
TO
ARCHANGEL AND ONEGA;

INCLUDING
INSTRUCTIONS FOR SAILING OVER THE BAR AT THE
ENTRANCE OF THE RIVER DWINA:

WITH AN ACCOUNT OF
*The various Signals made use of at the new Lighthouse on the
Island of Mudoska, or Moudjouk.*

TO WHICH ARE ADDED,
DIRECTIONS FOR THE HARBOUR OF HAMMERFEST,
BY CAPT. J. W. CROWE.

INTENDED TO ACCOMPANY
THE CHART OF THE WHITE SEA,
Drawn from the Surveys made by order of the Russian Government,
UNDER THE DIRECTION OF
CAPTAIN-LIEUTENANT REINEKE,
FROM THE YEARS 1829 TO 1833.

ORIGINALLY COMPILED
BY **J. W. NORIE**, HYDROGRAPHER,
Author of a New and Complete Epitome of Practical Navigation, &c.

A New Edition,
REVISED AND CORRECTED TO THE PRESENT TIME,
By **J. S. HOBBS**, F.R.G.S.



London :

PRINTED FOR, AND PUBLISHED BY, **C. WILSON,**
(**Late J. W. NORIE & WILSON,**)

Chartseller to the Admiralty, the Hon. E. I. Company, and Corporation of Trinity House,
At the Navigation Warehouse and Naval Academy,
157, LEADENHALL STREET, NEAR THE ROYAL EXCHANGE.

1847.

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IMPROVEMENT OF THIS, OR OTHER OF OUR WORKS,
ARE RESPECTFULLY SOLICITED.

Entered at Stationers' Hall.

Sailing Directions
FOR
THE WHITE SEA,
TO
ARCHANGEL AND ONEGA.

The Courses and Bearings are Magnetic, and the Soundings are those taken at low water.

An order, recently issued by the Lords Commissioners of the Admiralty, states, that "in order to prevent mistakes, which frequently occur from the similarity of the words starboard and larboard, in future, the word PORT is to be substituted for larboard in H. M. ships or vessels."

TAKING your departure from Lambaness, the northern point of the Shetland Islands, which lies in latitude $60^{\circ} 49'$ north, and longitude $0^{\circ} 46'$ west, your course to the North Cape is winding, so that it is left to your own judgment; only observing, on your passage to the North Cape, that you will meet with a difference in your variation as follows:— From the latitude of 63° to that of 70° , 3 points is the greatest. From the latitude of $67^{\circ} 30'$ to 69° is a fast reduction of the variation to that of $1\frac{1}{2}$ point; from 69° to 70° it is 1 point: 70° to $71^{\circ} 10'$ it is $\frac{3}{4}$ of a point, which is the latitude of the North Cape of Lapland, the longitude of which is considered about 26° east.

Vessels bound to the White Sea must make for the North Cape; and when abreast of this cape, steer E. by S., 12 leagues, for another projecting point of land, called the North Kyn, the variation there being about $\frac{1}{2}$ a point west. From North

Kyn to the point of land, called Stauningberg, steer S.E. by E., the distance being 20 leagues. By giving this point a good berth of 3 leagues, a S.E. course will carry you to Cape Sweetnose, which lies in latitude $68^{\circ} 10'$ north, and longitude $39^{\circ} 47'$ east, at a distance of 82 leagues.

When the North Cape bears S. by E., and you are distant from it 11 leagues, it appears lofty and dark, with two points branching out to the eastward of it: the Mother is also high and black, forming a singular hollow or valley in the middle; from thence to the east part of Maggeroe it is hilly and uneven; between the east and west ends are two conical hills, shaped like sugar-loaves. There is good anchorage at the south part of Maggeroe Island, in from 10 to 22 fathoms.

North Kyn is about 37 miles to the eastward of North Cape, between which and Maggeroe Island, is formed a wide, deep, and open bay. From hence the coast presents a broken appearance of several large projecting points and bays; one of the latter is named Slettness, where vessels occasionally anchor. Farther to the eastward you will discover a remarkable hill, situated at Horn Point, the port or larboard entrance to Tanny Bay: this is a wide and convenient place for vessels to run into. Horn Point is high and steep, of a dark appearance: the western point of the bay is low, and always looks white, seemingly covered with snow. When you are sailing to the south-eastward, and Horn Point bears from W. $\frac{1}{2}$ N. to W.S.W., at about the distance of 7 leagues, it will appear like an island. Having entered Tanny Bay, a point of land will appear right a-head: this divides the inner river into two branches.

The shore from hence runs south-easterly, having several large fiords or bays, one of which is about 4 leagues to the south-eastward of Horn Point, and may be known by two large hills, which appear at the bottom of the bay, when you have got the bay quite open. There is another large fiord, about 5 miles farther on; and also some lesser openings between this and Wardhuys Islands.

Wardhuys Islands lie about 17 leagues distant from Horn Point. There is good anchorage between them and the main; and on the S.E. end of the inner island stands a Danish fort, upon which a flag is always to be seen flying in war-time. To the southward of Wardhuys Islands the coast turns to the westward, and forms an extensive bay, within which is situated the town of Warenger. About 9 leagues S.E. of Wardhuys Island lies Fisher's Island, which is long and large, with several places of anchorage about it. At 8 or 9 leagues from the S.E. end of Fisher's Island is the Bay of Kola.

In running along the coast from Wardhuys to the south-eastward, steer S.E. $\frac{1}{2}$ E.; for should you go to the southward of S.E., particularly with light winds and foggy weather, you will run in too near to Kilduin Island, there being a remarkable indraught with such weather into the Bay of Kola.

THE BAY OF KOLA.—Having passed the S.E. end of Fisher's Island, the land to the N.W. of Kola Bay will appear very high and broken, like islands; and from Kola Bay to the north end of Kilduin Island it continues uneven; about midway between the bay and Kilduin, is a remarkable high hill. The north-west end of Kilduin is high, dark, and steep, with a flat or step about 20 feet high; but the S.E. point is low.

From Kilduin to Tieriebieri Point the shore is level. There is good anchorage in the Bay of Kola, and also between Kilduin Island and the main. At the latter place the anchorage is on the east side of the bay, and opposite to the huts, in from 10 to 14 fathoms water.

From Kilduin Island to Nagel Island the land continues to run south-easterly, having several bays and rivers, little known or frequented. The most remarkable objects you will pass are the Seven Islands, which lie scattered at a little distance from the main; here you may observe the fourth of these islands, which is small, and of great height, situated somewhat within the others. On the middle of this island, about half-way from its summit, is a remarkable square white

patch, supposed to be the dung of birds. Here the variation is $3^{\circ} 30'$ west. When within these islands, and between them and the main, from the third to the fifth island, the water becomes shallow, and the ground rocky, there being only 18 feet water at low spring-ebbs.

NAGEL ISLAND lies to the south-eastward of the Seven Islands, at a short distance from the main, having behind it good anchorage; as there is also in the mouth of the River Litza. Here, between the island and the main, is a *shoal*, which must be avoided; but as you advance farther in, you will find from 11 to 7 fathoms, fine sandy ground; or you may run up the river 3 or 4 miles, and anchor in 6 or 7 fathoms water. Here the tides rise and fall about 16 feet. This place abounds with cod and other fish.

From Nagel Island to Sweetnose Bay the land is high, and very irregular. Vessels taking their departure from Wardhuys Island to Cape Sweetnose, should steer S.E., easterly.*

CAPE SWEETNOSE, or SVETOINOS, is the northern extremity of a narrow isthmus, which runs out from the main, forming a kind of bay between, and sheltering it on the eastern side. Within this bay the water is deep; and on its western side are several islands, behind which there is good anchorage; and at the farther, or southern part of the bay, are some settlements of the native Laplanders.

The mariner, in advancing from the northward towards Cape Sweetnose, should keep his lead going; and when in a fairway for the cape, at the distance of 3 or 4 leagues off, in clear weather, he will perceive the cape, then bearing about S.W., or W.S.W., the soundings being from 30 to 45 fathoms, stony bottom: here the variation decreases to 1° west. Do not approach too near the cape, because it is *rocky*; and at the distance of $2\frac{1}{2}$ miles E. by S. from the pitch thereof, there is a *dangerous rock*, on which the *Diana* struck in 1804.

* The above directions between North Cape and Cape Sweetnose cannot be depended on, as no regular survey has yet been made of those coasts.

The tide was then flowing, rapidly rising 13 feet, by which the ship got again afloat. On a rock, 70 feet high at low water, and situated 2,100 feet from Cape Sweetnose, a wooden tower has been erected, 42 feet high, and painted red-and-white. This tower is situated N.N.W. from the cape, and may be seen, in clear weather, $10\frac{1}{2}$ miles. Cape Sweetnose is very low land; but $1\frac{1}{2}$ mile to the south-eastward it becomes hilly. Five miles farther it projects out towards the sea; and from thence to Lumbowski Islands it appears level. The hills and valleys always contain much snow.

From the above-mentioned situation, namely, with Cape Sweetnose bearing about S.W. or W.S.W., distant 3 or 4 leagues, steer S.E. $\frac{1}{2}$ S., about 14 leagues, which will carry you abreast of Point Gorodetski, keeping 3 leagues off the land. From thence you may shape your course S. by E., for 11 leagues, when you will be abreast of the white tower and lighthouse on Orlofka Point, about 2 leagues distant. This tower is in latitude $67^{\circ} 11'$ north, and longitude $41^{\circ} 22'$ east: but if, on reaching Cape Sweetnose, the weather should be thick and hazy, you will be guided by your soundings, and observing as near as possible the above courses, which will lead you clear of all danger.

ORLOFKA LIGHT.—A lighthouse has been established on Cape Orlofka, on the Coast of Lapland, in latitude $67^{\circ} 11' 30''$ north, and longitude $41^{\circ} 22' 15''$ east. It shows a fixed light, 232 feet above the level of the sea, and visible from N. by W. $\frac{3}{4}$ W., round by east, to south, at the distance of 20 miles.

The old charts represented what was called *Knock John*, a long and narrow *ridge of sand*, beginning in a point somewhat to the northward of Cape Sweetnose, and stretching southward as far as the 67° of latitude, with from 40 to 3 fathoms water over it; but this appears to have been chiefly imaginary, as the late Russian surveys* make no mention of it, but

* See the new Chart, which accompanies these Directions.

exhibit various *ridges of shoal ground*, and some very *dangerous patches*, in general lying more to the eastward, the nearest of which to the Lapland shore lies from E. by N. to E. by S., distant $12\frac{1}{2}$ miles from the white tower and lighthouse on Orlofka Point; but as no written description would give the mariner an adequate idea of these dangers, we refer him to the chart, where he will find the whole of them, together with other parts of the navigation, carefully delineated.

As you sail along, you will observe that the land to the northward of Orlofka, or Orlogenose Point, is all high and level; and in the bight of Orlofka a large quantity of snow is always perceptible. On the Point of Orlofka a white tower and lighthouse has lately been erected, and about $\frac{1}{2}$ a mile within the point, upon a hill, stands a large cross. At 3 miles southward of the point are three remarkable hills; the two northern ones are round, the other flat. Having arrived abreast of Orlofka Point, bring it to bear about W. $\frac{1}{2}$ S., distant 5 or 6 miles, and proceed S. $\frac{1}{2}$ W. for 7 leagues. About 5 miles from Orlofka Point lie the Three Islands; $\frac{3}{4}$ of a mile before you come to which you may perceive a large valley, which forms the entrance to the River Russinga. These islands lie well open of the main, and there is a dark piece of land near them, which much resembles an island: the north part of the passage is $\frac{1}{4}$ of a mile wide. Within here is a place frequented as a rendezvous for small vessels bound northward. The southern passage has a *rocky shoal* extending from the islands nearly a mile.

Having passed these islands, with the above course and distance, you will open Panoi River, which has a remarkable appearance. On the port or larboard or south-western shore stand two houses, the eastern one being much larger than the other. When Panoi River comes quite open, it will bear from you N.W. by N.: a S.W. by S. course will then carry you to Sosnovits, or Cross Island, a distance of 10 leagues.

About 5 miles to the southward of Panoi River are three

remarkable hills, high towards the south, but sinking down to the northward. Between these and Panoi River is a small hill inland, resembling a hay-cock. From hence the land, so far as Glubokaya River, wears a sterile appearance, but to the southward it becomes woody.

CROSS ISLAND, or SOSNOVITS, will easily be distinguished by several wooden crosses upon it. Two of these stand upon the north end of the island, which is high, and nine upon the southern part, which gradually becomes low, and slopes down to its extremity; there is also a red tower, which has lately been erected on it. There is a good and safe channel between Cross Island and the main, and vessels may find anchorage under the island, in 5, 6, or 7 fathoms, on a bottom of blue mud. This will be found preferable to anchoring at a distance from the island, or in the bight near the main, for there the ground is rocky.

A white tower has lately been erected on the north side of the River Pulonga.

From Cross Island, if bound to Archangel, you will run over for Cape Katness, or Blue Nose, the distance being about 22 leagues; but as the current frequently sets strong, particularly in the spring, for the Bay of Mezen, it will be advisable to steer, first S.W. $\frac{1}{2}$ S., 6 or 7 leagues, and then S.S.W., directly for Katness. In proceeding on the former course, along the shore, you will observe two remarkable hills inland, very high and woody, with a hollow in the middle. About 5 miles inland there is a particular wood, 2 miles in length. This wood is visible at a great distance, and appears like two hills, particularly when you are to the eastward of N.E. This forms a remarkable object for ships when beating down with north-easterly winds.

In sailing to Archangel, in the spring of the year, if you fall in with the ice, your best way will be to keep close to the Lapland shore, as you will then have a greater chance of getting through it. In beating up the White Sea, it is advisable to keep on the Lapland shore, as you will have a stronger

flood and weaker ebb than on the opposite coast, and you will find good anchorage all along the coast so far as Cross Island; but beyond that the ground is bad; and as high up as Pelitza River, you must not approach the shore nearer than $2\frac{1}{2}$ miles, there being a number of *sunken rocks* all along.

INSTRUCTIONS FOR THE ENTRANCE OF THE RIVER DWINA TO ARCHANGEL.

SAILING up the White Sea towards Archangel, men-of-war and merchantmen, after passing the Winter Hills, or what is generally called Blue Nose Point, must shape their course parallel to the land, keeping near to it; and when they are off the middle of the projecting point, on the port or larboard hand, called Nicholas Point, at the entrance of what is denominated the Dry Sea, they will observe a tower, lately built, (A)* 84 English feet in height from the base, which is painted white, and at the bottom of this tower is the pilots' house; when arrived abreast of this tower, they will be met by pilots, whose duty it is to convey them over the shallow parts of the bar, and up to the Port of Archangel.

But in case any ships or vessels, on account of the wind, current, or other circumstances, should be driven from the coast to the westward, they must use their utmost endeavours to get sight of the above-mentioned tower, and bring it to bear N.E. by N., keeping it in that direction until they get to bear S.E., a large floating cone-buoy, painted red, with a flag-staff and vane, which was laid down in the summer of 1818, (D) instead of the common buoy formerly placed at the north end of the outermost shoal; with these marks on, they will have good anchoring ground, in 6 fathoms, (C) at the distance of 5 versts (nearly 3 nautical miles) from the shore, and 6 versts

* The letters in the above instructions refer to the Plan of the Entrance of the River Dwina to the Port of Archangel, included in the New Chart of the White Sea, already referred to.

from the bar, where they must wait for pilots, who will come off to their assistance from their house.

But should it happen that, from stress of weather, vessels cannot approach near the tower, or from loss of anchors cannot wait for a pilot, and should be obliged, as the last resource, to attempt passing the bar without a pilot, in this critical situation, to prevent danger as much as possible, the following instructions must be attended to:—

From the above-mentioned large red cone-buoy (D), red buoys are placed on the starboard, and black buoys on the port or larboard, of the proper channel; if, therefore, merchant-vessels are obliged to attempt this dangerous passage without a pilot, they must bring the cone-buoy in a line with two masts on the shore (F), which were erected about the latter end of June, 1818; and leaving this buoy about $1\frac{1}{2}$ or 2 cables' length to the starboard, steer between the red and black buoys as far as the place pointed out by the letter G, where they may come to an anchor. But if they wish to continue their course between the beacons laid down to show the channel, they may proceed till they come to H, where the guard-ship is moored.

In the spring of 1842, the following notice was given respecting the beacons at the mouth of the Dwina:—

Navigators are hereby informed, that the two beacons or signal-poles hitherto standing on the western shore of the Island Mudoska, near the lighthouse, to denote the outer edge of the bar at the entrance of the north channel of the Dwina, are removed farther to the southward, and placed so as to show, when brought on with each other, the channel over the bar.

The beacons now stand in the following positions, viz:—the first, which is nearest to the sea, and bears two black balls, is 2474 yards S. $13\frac{1}{2}^{\circ}$ E. from the lighthouse; and the second, bearing one ball, is 2688 yards S. $16\frac{1}{2}^{\circ}$ E. from it. The two beacons bear N. 60° W. and S. 60° E. from each other; distant 215 yards.

The height of the beacons from the ground is 91 feet, and from high-water mark $101\frac{1}{2}$ feet.

It is, however, recommended, if possible, not to attempt passing the bar without pilots, as it is attended with the utmost danger, not only from the bar, but other adjacent shoals. All vessels coming from the sea ought to avoid passing the shoals without pilots; and if the number of ships should be so great that there are not sufficient pilots to attend them, those without pilots must come to an anchor, and wait their return from other vessels; likewise if pilots cannot come off from the tower (A), on account of gales of wind, the vessel or vessels ought to cast anchor, and wait for their arrival; for if, on the contrary, they attempt passing the bar or shoals, and any accident should happen, they must take the consequences on themselves.

REMARKS.—The depth is marked in English feet at low water. The rise of the tide is 3 feet on the bar, and the time of high water, on full and change days, 7h. 18m.; but with strong winds from the N.N.W. to N.E., the tide will rise much higher. The variation at Archangel is about $1\frac{1}{2}$ degree east.

NEW LIGHTHOUSE *on the Island of Mudoska, or Moudjouk.*—A stone lighthouse has lately been erected on the Island of Mudoska, for the guidance of vessels entering and leaving the Port of Archangel. The height of the lighthouse is 130 feet from the summit to the base, and the whole height of the lantern above the level of the sea is 140 feet. It stands in latitude $64^{\circ} 55'$ north, and longitude $40^{\circ} 17'$ east. The light, which is fixed, will be visible during the months of August, September, and October in every year, from N.N.W., westward, to S.E. by S., at the distance of 16 miles, in clear weather.

The following instructions were issued from the Russian Government in 1839:—

“On the approach of any ship near the bar at Archangel, the pilots on duty at the lighthouse must hold themselves in readiness to go on board as soon as the vessel is abreast of

the iron gates; they must endeavour to go on board, even during tempestuous weather, if possible.

"As soon as the pilots are on board their boat, the inspector of the lighthouse must indicate by signals the direction of the current, and the depth of the principal channel on the bar. The signals to be used will be those shown in Table No. 1. (See the Chart.)

"If from the high sea, or the violence of the wind, the pilots should be prevented from going on board the vessel, the inspector must give notice of it to such ships requiring a pilot, by hoisting balls, which will indicate the setting of the current, and the depth of the principal channel, as shown in Table No. 2. If, however, after the signal has been made, indicating the impossibility of a pilot giving assistance, the vessel should be compelled to enter the river, then the captain must give notice of it, by hoisting half-mast high, on his top-gallant-mast, the flag which he had hoisted for a pilot, and the lighthouse must answer that signal by lowering the balls half-mast. The vessel will acknowledge that signal by re-hoisting her own flag to its former position; and if the buoys are in their proper places, then the lighthouse will re-hoist the balls; but if the buoys should have drifted, then the balls must be taken down altogether, which will signify that there is no reliance to be placed on the buoys, and, therefore, the captains must use their own discretion."

CROSS ISLAND to ONEGA.—Vessels being abreast of Cross Island, and bound to Onega, must steer for Cape Donega. This will require a S.W. $\frac{1}{2}$ W. course; but a proper allowance must be made for the current; and therefore you should run somewhat more westerly; you will frequently observe the water ripple, but there is no danger. At a distance Cape Donega will appear high, covered with tall trees, and having a white sandy shore. N.N.W. from the point of the cape lies the small Island of Rovestra, or Gishginsh, of considerable elevation, and having a tower upon it: here the pilots for Onega commonly reside. There is a narrow channel

between the cape and island, with 4 or 5 fathoms water in it, but it should not be attempted by strangers.

Gishginsh Light.—A lighthouse has been established on the northern extremity of Gishginsh Island, at the east side of the entrance of the Bay of Onega, in latitude $65^{\circ} 12' 17''$ north, and longitude $36^{\circ} 51' 30''$ east; it shows a fixed light, 148 feet above the sea, and visible from all parts of the horizon, to the distance of 17 miles.

The N.E. side of Rovestra is foul, and so is the southern part; therefore you must not come within 2 miles of the former, until you have brought the western point of the Island to bear south; you may then approach nearer, or within a mile of it; but vessels meeting with contrary winds, and not obtaining a pilot, will do well to stand over to the westward for Anger, or Anzersk Island, on the northern side of which they may ride in safety; here the best anchorage will be to bring the western end of the island to bear N.W. by W., and the eastern hummock E. by S., at about a mile distant from the shore.

ANGER, or ANZERSE ISLAND, lies about 13 miles to the westward of Rovestra Island; its length from E. to W. is 9 miles; its breadth is very narrow. At $1\frac{1}{2}$ mile to the northward of Anger Island is a *sunken rock*, called *Troitskie Stamika*; it has deep water all around it, and must be carefully avoided. To the westward of Anger is the large irregular Island of Solvetski, on the S.E. side of which is Muksalma Island, having an extensive *reef* stretching from it to the south-eastward. This group of islands lies directly in the middle of the entrance to the Gulf of Onega. There is a channel between Solovetski and Muksalma Islands and Anger Island, in which are from 10 to 30 fathoms water. There is also a small *rock* above water, named *Kemski*, bearing W.N.W., distant 8 miles from the north-western part of Solovetski Island.

Having reached Rovestra Island, the customary passage to Onega is between that island and Anger; a S.W. by S. course

will carry you right through this channel; on your port or larboard hand you will see the Point of Orloff; which is high, and has a signal-post upon it, and near it the Konkova Hills. To the southward of Orloff Point is the Bay of Pushlachta, which is both safe and commodious, and to which all vessels arriving too late in the season; when it becomes dangerous to run for Archangel, should immediately repair. Directly N.W. by W. $\frac{1}{2}$ W., about 4 miles from the mouth of this bay, the Russian Charts exhibit a small *sand-bank*, about $3\frac{1}{2}$ miles in length from north to south, and 2 in breadth, with 5 fathoms on its northern and southern ends, and $3\frac{1}{2}$ and $2\frac{1}{2}$ on its central and shoalest part. About $6\frac{1}{2}$ miles to the southward of the entrance to Pushlachta is Point Tcheshmenski; having passed which, at the distance of 3 miles, a S.E. $\frac{1}{2}$ S. course will carry you down the gulf: and when you get the monastery on Kio Island to bear east, you will be about 5 miles distant from the bar of the River Onega, and may steer E.S.E. directly for it. In this passage the old directions make mention of several overfalls; but the new Russian Survey does not authorize us to notice any. About 20 miles S.E. $\frac{1}{2}$ S. from Tcheshmenski Point is Lempsa Church, easily to be known by the white sandy hills about it. The mariner will be careful to avoid standing out too far to the westward, or getting entangled within the Ostrava Islands, which lie scattered about the western side of the Gulf of Onega, because there are numerous patches of shoal water, and the setting of the tides is very uncertain. In sailing along the eastern shore, you should keep in 6, 7, 8, or 10 fathoms. Having passed 8 or 9 miles to the southward of Lempsa, the eastern shore bends inward more easterly toward Purmena and Kanda, &c. The shore becoming shallow and sandy, to the northward you will see, over the bottom of a sandy bay, the Ruchevka Hills, and to the southward of Kanda, the Winter Hills. About 5 leagues S.S.E. $\frac{1}{2}$ E. from Lempsa, and 6 leagues W. by S. from Kanda, lies the small Island of Pur Luda, which you may pass on either side. Before the entrance to Onega lies the Island of

Kio, and a little outside the bar are the Shakloni Islands. If you are going to the westward of Pur Luda, endeavour to bring these islands in one, or nearly so, bearing S.E. $\frac{1}{2}$ E.; but if you sail to the eastward of Pur Luda, steer for the Shakloni Islands S.S.E., and, giving them a good berth on your port or larboard hand, taking care to avoid a *sunken rock*, which lies $2\frac{1}{4}$ miles to the N.W. of them, you will arrive at the Bar of Onega.

THE GULF OF KANDALAX, or KANDALAKSHA, is a large arm of the sea, stretching to the north-westward of the White Sea. Its entrance between Cancer, or Point Pur Navolok, and Olenitsa, is full 30 miles wide, with very deep water in it; but as you advance, it becomes narrow and shallow. From abreast of Cancer Point it extends north-westerly full 29 leagues, and contains several islands, towns, and bays; but they are little frequented by strangers. The Town and River of Kandalax are at the farther end of the gulf. From Rovestra Island a N.W. course nearly, will carry you direct to Kandalax; but if you should take your departure from abreast of Cross Island, you should steer S.W. $\frac{1}{2}$ W., 15 or 16 leagues; and then a due westerly course will carry you to Cancer Point, whence you may proceed N.W. along the port or larboard side of the gulf, until abreast of, or rather beyond the Island of Waliki. Here are some spots shoal water, with from 46 to 105 fathoms about them; having passed these, steer up midway of the gulf; but there are in its upper part so many dangers, that a pilot will always be requisite.

MEZEN BAY and RIVER.—This bay lies on the eastern side of the White Sea, and is wholly out of the way of the passage to Archangel, Onega, &c. Vessels bound to either of these places are commonly cautioned to shun Mezen Bay, on account of the number of shoals which lie about its entrance; and the indraught which, especially in the spring, when the snow melts, and swells the rivers in the White Sea, occasions a strong ebb to set toward the bay.

Morshovets Light.—A lighthouse has been established on

the N.W. extremity of Moshovets Island, in the entrance of the Bay of Mezen, in latitude $66^{\circ} 45' 40''$ north, and longitude $43^{\circ} 29'$ east; it shows a fixed light, 162 feet above the sea, visible at the distance of 18 miles, from N.N.W. $\frac{3}{4}$ W., to S.W.

Mezen Bay may be considered to be bounded by Cape Voronoff, or Good Fortune, which is high and steep, on the westward, and Cape Konoushin on the eastward; to the north-eastward of Cape Voronoff, 12 miles, is the Island of Morshovets, the N.E. part of which is high and steep: off the eastern and south-eastern parts are several dangerous *shoals*, some of which are nearly dry, others of 1 and $1\frac{1}{2}$ fathom water, making the passage to the eastward of the island hazardous and unsafe. N.W. by N. from Cape Voronoff, distant nearly 3 leagues, there is a small *knoll*, of $5\frac{3}{4}$ fathoms, though between it and the cape there are 8 and 7 fathoms; a still more dangerous *shoal* lies W. $\frac{1}{2}$ S., distant about 2 leagues from the nearest high land of Cape Voronoff; this shoal has not more than $10\frac{1}{2}$ feet water upon it, and might prove highly dangerous to ships beating in this vicinity. To the southward the Bay of Mezen lies completely open and free from danger: its entrance, abreast of Cape Abramoff, is 7 leagues, and as it runs in to the southward, it narrows rapidly. On the western side is the River Kuloi, from the entrance of which, the Town of Mezen is 26 miles distant: in Mezen River and Bay are 3, 4, 5, 6, 8, and 12 fathoms water, the depth increasing as you get to the northward. There is no other bay on the eastern shore between Mezen and Cape Candinose.

The variation on the eastern side, from Mezen to Candinose, appears to be somewhat easterly, while on the western coast it is a little to the west; at Cape Candinose it is 4° east, and at Cape Sweetnose $1\frac{1}{2}^{\circ}$ west.

. TIDES.—The flood to the eastward of North Cape sets from N.W. and N.N.W., and along the coast to Cape Orlofka. At Tanny Bay it flows till 3 o'clock; at Wardhuys it flows till 4 o'clock; at the Island of Kilduin it flows at 7 o'clock,

[WHITE SEA.]

C

and the water rises about 12 feet; at the Seven Islands at 8 o'clock; at Cape Sweetnose it flows at half-past 8, and the water rises from 12 to 17 feet; at the Three Islands it flows at a quarter past 2 o'clock, and the tide rises from 16 to 18 feet; at Cross Island it flows at a quarter past 4 o'clock; at Blue Nose at half-past 5; between these places the flood sets about S.W. by W. At the Bar of Archangel it flows at 7h. 18m.; at Cape Donega at 6; and at Onega at 8h. 40m. Between Cape Donega and the Bar of Onega, the flood-tide sets S. E. by S., nearly, along the land, at the rate of 2 knots in spring-tides; and the water rises about 6 feet.

A D D E N D A.

*We insert the following Extracts from a Work, published by
ARTHUR DE CAPELE BROOK, M.A., F.R.S., &c., as they may
prove highly important to Navigators of the Northern Seas.*

"The settlement of Hammerfest is situate on the coast of Finmark, usually known by the name of Danish, or Norwegian Lapland; the latter of which is now, however, the most appropriate, as it no longer belongs to Denmark, Norway having been annexed to Sweden. The whole of the northern coast, up to the North Cape, is covered by a deep range of islands, which at some time or other, probably formed part of the continent, and are now of the greatest importance to it, by bearing the whole brunt of the rage of the Arctic, or Polar Ocean, sheltering it from the violence of the storms, and securing what may be deemed an inland navigation, which is continued with little interruption from the North Cape in Finmark to the North, or South Cape of Norway, in latitude 57° 58' north. Hammerfest is built on one of these islands, that of Quallöen, or

Whale Island, which is not exposed to the open ocean, but lies between the continent and the large Island of Sorøe; this shelters it to the west, as the Islands of Seyland do to the south and S.W. The Island of Qualøen, which is one of the most considerable on the Finmark coast, is barren and mountainous, totally uncultivated, and without wood, except brush-wood, or the dwarf-birch. Hammerfest lies on the S.W. side of it, about 40 miles N.E. from Hasvig, 50 N.N.E. from Alten, and near 60 N.W. from the North Cape.

"The Bay of Hammerfest, which is sufficiently capacious to contain nearly the whole British Navy, is well sheltered by the surrounding mountains from all winds, except from S.S.W. to W.S.W., and even when these blow hard, vessels will always ride in safety near the Fugleness shore, where the anchorage is the best, and the depth varies regularly from 5 to 20 fathoms, which is the general depth of the whole bay.

The Harbour of Hammerfest,* though small, and not able to hold more than 10 or 15 vessels, is perhaps one of the most secure in the world, as no wind can affect its shipping. In fact, it may be said to be completely land-locked, so that when a gale of wind is blowing on the outside, it remains unruffled, and presents almost the appearance of an inland basin. The anchorage is at the same time excellent, in from 3 to 5 fathoms, with good moorings for the vessels, by means of iron rings driven into the rocks. This accommodation of rings is common to all the coast of Nordland and Finmark; and for the use of them a small impost is collected from every vessel, both native and foreign. The port altogether is so convenient, from its easy access and vicinity to the open ocean, as well as the safety it affords from almost every kind of weather, that it is much to be regretted it is so little known to our navigators, as many a vessel, lost on these exposed and dangerous coasts, would doubtless have been saved, had they been aware

* A plan of Hammerfest Bay and Harbour is given in a Chart of the Coast of Norway and the White Sea, published by the proprietor of this Work.

of the entrance and situation of so secure a harbour, in which to take shelter.

"It was in 1819 that the first Englishman settled himself upon the Finmark shores. This was Mr. John Crowe, who, having been for some time in the naval service of Russia, had quitted it, with several other officers, on the breaking out of the war between England and the former power. Accidental circumstances having thus thrown him out of the line of his profession, he turned his attention to commerce; and being well acquainted with the language, as well as the state and capabilities of the northern trade of Russia, he, after having explored the coasts of the White Sea, established a factory at Fugleness, situate on the western coast of Finmark, and forming the Bay of Hammerfest. Anterior to this period, at least in modern times, no British vessels had visited these coasts for the purposes of commerce; and although they afford safe and commodious harbours, they are altogether so little known to our navigators, that our vessels in their voyages to and from Archangel, Onega, and other parts of the White Sea, have, in the worst weather, preferred keeping the sea at any risk, rather than trust themselves within reach of a coast, the very sight of which is, with reason, formidable to those unacquainted with it. In this respect alone, the above establishment will be of extreme advantage to our trade in general with the White Sea, both by rendering these coasts more known, and removing the impressions of alarm and distrust: for instance, how important it must be for a vessel to know that in the vicinity of the North Cape, on a coast considered hitherto as perfectly savage and uninhabited, a secure and commodious harbour is open to her; where not only good pilotage may be afforded her, but she may supply herself with water, and indeed, almost everything she may require.

"The situation of Hammerfest is very convenient for conducting a whale fishery, not only as to its own coast, but from its vicinity to Cherie Island and Spitzbergen. Vessels can be fitted out at a very trifling expense, and perform two voyages

to those regions, while vessels from any other country can scarcely accomplish one. Several experiments of this nature have been tried, though upon a very limited scale, for want of adequate means and knowledge. Sufficient, however, has been ascertained, to establish the practicability and advantage of such an undertaking, while the progress or prosecution of it would probably ensure the means, and afford the insight and experience which are wanted. A very extensive fishery was formerly conducted on this coast; and from the accounts and remains of the establishments along the shores, there is reason to suppose that it was profitable. A considerable bounty was offered by the Danish Government to those who should prosecute whale-fishing here; and for a series of years the Dutch visited the coasts, and were very successful. From a combination of circumstances, however, the pursuit was discontinued, and at present it is scarcely known that it ever existed. The number of fin whales now visiting the coast is very considerable; but no one has the means, or at least sufficient enterprise, to revive the fishery. No greater proof of the practicability of renewing it need be given, than the number of whales annually struck by the Laplanders while on the banks, though it is true few are captured; but this is for want of proper gear to secure their prey when struck."

BEAR, CHERIE, or CHERRY ISLAND.—This island was first discovered by the Dutch in 1596, by whom it was called Bear Island; and was afterwards visited by Stephen Bennett, who was sent thither by Sir Francis Cherie, in the year 1603, and was named by Mr. B., Cherie Island, since corrupted to Cherry Island. Its greatest extent is about 10 miles; and it appears at a distance like a saddle, both extremes being very high and the middle low, and can be seen 20 leagues off in fine weather. On the N.E. end are three regular hills, of considerable elevation, covered in general entirely with

snow; the S.W. end is more irregular. The position of this island has been variously estimated; Mr. Phillips, Master of H.M. ship *Alexandria*, in 1813, made his anchorage off the N.E. coast, in latitude $74^{\circ} 33'$ north, and longitude $18^{\circ} 25' 45''$ east, and the variation of the compass $11^{\circ} 50'$ west; but Captain Scoresby states its north end to be in latitude $74^{\circ} 30'$ north, and longitude $19^{\circ} 5'$ east; and a British Officer, in 1814, places its south end in latitude $74^{\circ} 19'$ north, and longitude $20^{\circ} 7'$ east.

Besides morses or sea-horses, this island abounds with bears, foxes, and sea-fowl, and its shores, at certain seasons, are said to be visited by cod and haddock. Much drift-wood also occurs on the coast. Lead ore in veins at the surface of the ground has been found here; likewise coal of a tolerable quality, and specimens of virgin silver.

At the N.E. point is a little bay with good anchorage, where ships may ride in shelter with the wind from S.E. to S.W., but exposed from E.S.E. (north about) to W.S.W.; although this is the only bay where a ship can run for shelter in blowing weather, the anchorage is good all round the island. Mr. Phillips found good anchorage off the N.E. side in 20 fathoms, shelly bottom, with a little island, called Gull Island, just open of the N.E. point of Cherie Island, about 3 miles from the shore.

On the full and change it is high water at 2h. 30m., and the rise of the tide by the shore is 3 feet. The flood sets in from the S.W., and the ebb in a contrary direction.

SAILING DIRECTIONS
FOR THE
HARBOUR OF HAMMERFEST,
(*On the Coast of Norway,*)
BY CAPTAIN J. W. CROWE.

SHIPS coming from the southward and westward generally make the high Island of Fugeloe,* it being a remarkable land-mark, flat on the top, with perpendicular sides, and having a small island lying N.W., distant about $\frac{1}{3}$ of a mile; they then steer along the coast, passing the high Island of Arenoe; till they make the Island of Loppin, which is known by its being the lowest land on the coast, and flat on the top. There are two *sunken rocks*, with deep water all round, between Arenoe and Loppin, but they do not lay in the track of vessels, and the sea always breaks over them. Pilots are always to be had at Loppin and Hasvig, and you may stand close round Loppin, and steer for the Island of Silden, which makes like sugar-loaves. There is good anchorage between Loppin and the main, in from 10 to 18 fathoms water, sandy bottom, and a clear passage right through; as it is all day-light,† and there is no other danger but what is here mentioned, vessels may safely run in and get into smooth water, when they are always sure to have boats come off to their assistance. From Loppin steer towards the Point of Hasvig; the course is about E.N.E. by compass, distant 16 miles. Giving Hasvig Point a fair berth, steer E. by N. up Soroë Sound 15 miles, when you will come to a small island lying a cable's length from the N.W. shore. There is a passage on both sides of this island, but the northern

* Outside of Fugeloe a *rocky shoal* is said to exist, bearing from it N.W., distant 7 or 8 miles, which the sea breaks over in bad weather, its length being about 3 miles, running E.N.E. and W.S.W.; but I have been cruising off there twice for a week together, without seeing it; but I have observed, in the same direction, a very heavy rippling of the current, caused by the meeting of the inside and outside currents.

† During the navigable season of the year.

shore is the one generally used: there are *small rocks* along the northern shore, but they are all closed in and above water. In a direct line, distant about $1\frac{1}{2}$ cable's length from the small island, is a *sunken rock*, with 3 feet water on it at low water, and 17 fathoms close to it on the southern side; therefore vessels must not stand too far to the northward till they are a sufficient distance past the small island. By this time you will make the high Island of Hogen which you may steer directly for, when you will see the house with a red roof, and a flag-staff on Fugleness Point,* which you must steer for; give the point a fair berth, and you may bring up above the warehouses abreast of the ring, in from 7 to 15 fathoms water, sand and mud.

Coming from the northward, after making the Island of Soroe, steer in between Soroe and Ingen, and you will make Ships (holm) or Island; then steer between it and Soroe for the high land of Mulling, the course being S.S.W., and the distance 10 miles; you will then steer along the land till you pass the Island of Milkey, which is known by running like a point into the sea. Between Milkey and Qualøe is a passage, but strangers must not attempt it, as it is shoal and has *sunken rocks* about it, therefore haul round Milkey, to which give a good berth, as there lies a *rocky shoal* on the S.W. point, about $\frac{1}{2}$ a cable's length from the shore; then make Fugleness Point, and bring up according to the foregoing directions. It must be observed, that the tide outside runs 9 hours to the N.E. and $3\frac{1}{2}$ hours to the S.W.; inside, the tides are regular, only the stream does not shift in mid-channel till it is half-ebb on shore. In turning into Hammerfest Bay, you must not stand too close to the eastern shore, as there lies a large *sunken rock* about a cable's length off, which is nearly dry at low water; it is 2 miles from Hammerfest, and the mark to clear it is the house on the flat at the top of the bay, $\frac{1}{2}$ a cable's length open of Hammerfest Point or the warehouses

* Fugleness Point lies in lat. $70^{\circ} 39' 51''$ N., and long. $23^{\circ} 43' 15''$ E.

A USEFUL TABLE FOR FINDING THE DISTANCE OF AN OBJECT BY TWO BEARINGS, AND THE DISTANCE RUN BETWEEN THEM.

Difference between the Course and Second Bearing in Points of the Compass.

Pts.	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24								
1	1.00	0.89	0.81	0.74	0.69	0.64	0.60	0.57	0.54	0.52	0.49	0.48	0.46	0.45	0.43	0.42	0.41	0.41	0.40	0.39	0.39	0.40	0.41	0.41	0.42	0.43	0.45	2	
2	1.12	1.00	0.91	0.83	0.77	0.72	0.67	0.64	0.60	0.58	0.55	0.53	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.43	0.43	0.44	0.44	0.45	0.46	0.47	0.48	21
3	1.23	1.10	1.00	0.92	0.85	0.79	0.74	0.70	0.67	0.64	0.61	0.59	0.57	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.47	0.47	0.48	0.48	0.49	0.50	0.51	22
4	1.34	1.20	1.09	1.00	0.93	0.86	0.81	0.77	0.73	0.69	0.67	0.64	0.62	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.53	0.53	0.53	0.53	0.53	0.54	0.55	0.56	23
5	1.45	1.30	1.17	1.08	1.00	0.93	0.88	0.83	0.79	0.75	0.72	0.69	0.67	0.65	0.63	0.61	0.60	0.59	0.58	0.57	0.57	0.57	0.57	0.57	0.57	0.58	0.59	0.60	24
6	1.56	1.39	1.25	1.16	1.07	1.00	0.94	0.89	0.84	0.80	0.77	0.74	0.72	0.69	0.68	0.66	0.64	0.63	0.62	0.61	0.61	0.60	0.60	0.60	0.60	0.61	0.62	0.63	25
7	1.66	1.48	1.35	1.25	1.14	1.07	1.00	0.94	0.89	0.85	0.82	0.79	0.76	0.74	0.72	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.64	0.64	0.64	0.65	0.66	0.67	26
8	1.76	1.57	1.42	1.31	1.21	1.13	1.06	1.00	0.95	0.91	0.87	0.84	0.81	0.78	0.76	0.74	0.73	0.71	0.70	0.69	0.68	0.67	0.67	0.67	0.67	0.68	0.69	0.70	27
9	1.85	1.65	1.50	1.37	1.27	1.19	1.11	1.03	0.96	0.92	0.88	0.85	0.82	0.80	0.78	0.76	0.74	0.73	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	28
10	1.94	1.73	1.57	1.44	1.33	1.24	1.17	1.10	1.03	0.98	0.94	0.90	0.87	0.84	0.82	0.80	0.79	0.77	0.76	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	29
11	2.02	1.81	1.64	1.50	1.39	1.29	1.21	1.13	1.06	1.00	0.95	0.91	0.87	0.84	0.82	0.80	0.79	0.77	0.76	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	30
12	2.10	1.88	1.70	1.56	1.45	1.35	1.27	1.20	1.14	1.08	1.04	0.99	0.95	0.91	0.88	0.85	0.84	0.83	0.82	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	31
13	2.17	1.94	1.77	1.62	1.50	1.40	1.31	1.24	1.18	1.13	1.08	1.04	0.99	0.95	0.92	0.89	0.87	0.86	0.85	0.84	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	32
14	2.24	2.01	1.82	1.67	1.54	1.44	1.35	1.28	1.21	1.16	1.11	1.07	1.03	0.99	0.95	0.93	0.91	0.90	0.89	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	33
15	2.30	2.06	1.87	1.71	1.58	1.48	1.39	1.31	1.23	1.17	1.12	1.08	1.04	1.00	0.97	0.94	0.92	0.90	0.89	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	34
16	2.36	2.11	1.92	1.76	1.63	1.52	1.43	1.35	1.27	1.21	1.17	1.13	1.09	1.05	1.02	0.99	0.97	0.95	0.94	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	35
17	2.41	2.16	1.96	1.80	1.66	1.55	1.46	1.38	1.31	1.23	1.17	1.13	1.10	1.08	1.05	1.02	1.00	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	36
18	2.46	2.20	2.00	1.83	1.69	1.58	1.49	1.40	1.33	1.27	1.22	1.17	1.13	1.10	1.07	1.04	1.02	1.00	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	37
19	2.50	2.24	2.03	1.86	1.72	1.61	1.51	1.43	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	38
20	2.53	2.27	2.06	1.89	1.75	1.63	1.53	1.44	1.37	1.31	1.25	1.21	1.17	1.13	1.10	1.07	1.04	1.02	1.00	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	39
21	2.56	2.29	2.08	1.91	1.76	1.65	1.55	1.46	1.39	1.33	1.27	1.22	1.17	1.13	1.10	1.07	1.04	1.02	1.00	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	40
22	2.59	2.31	2.10	1.92	1.78	1.66	1.57	1.47	1.40	1.34	1.28	1.23	1.17	1.13	1.10	1.07	1.04	1.02	1.00	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	41
23	2.60	2.32	2.11	1.93	1.79	1.67	1.57	1.48	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	42
24	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	43
25	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	44
26	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	45
27	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	46
28	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	47
29	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	48
30	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	49
31	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	50
32	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	51
33	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	52
34	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	53
35	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	54
36	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	55
37	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	56
38	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	57
39	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	58
40	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	59
41	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	60
42	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	61
43	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	62
44	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.96	0.95	0.95	0.95	0.95	0.95	0.95	63
45	2.61	2.34	2.13	1.94	1.80	1.68	1.57	1.49	1.41	1.35	1.29	1.24	1.1																

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